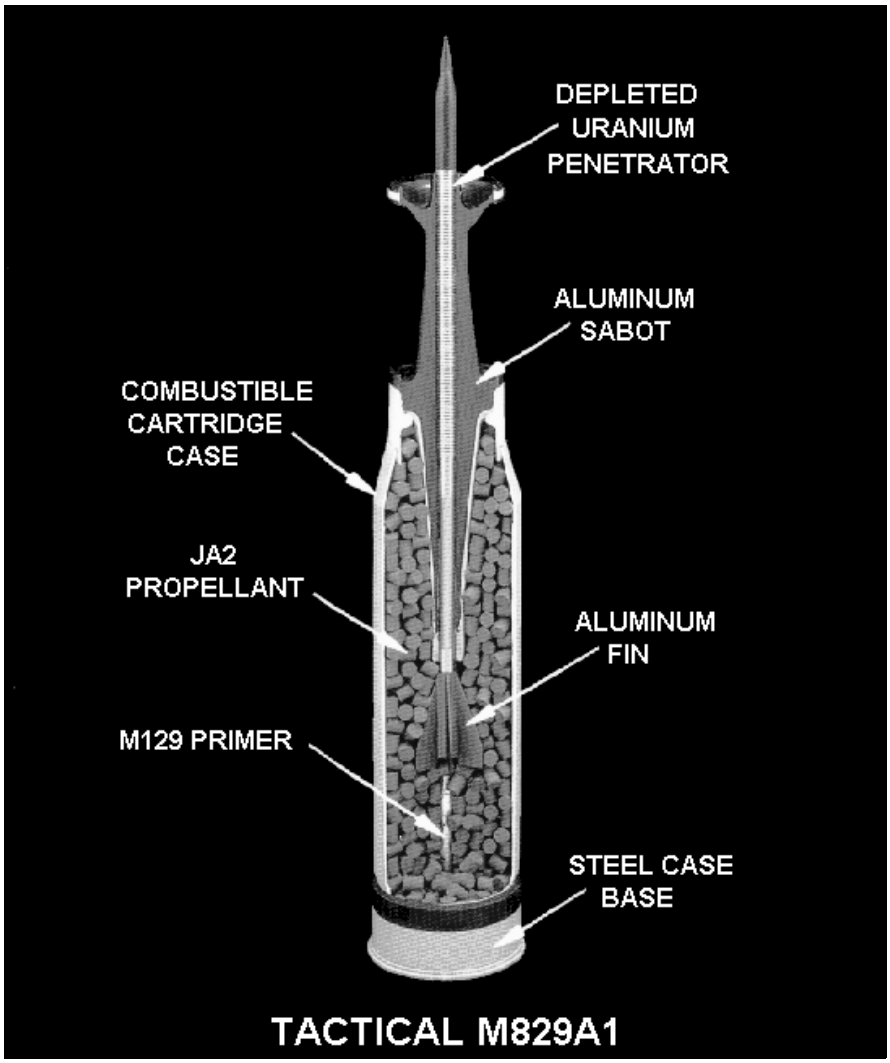
Depleted Uranium Without the Rocket Science

by Captain Pat Paulsen

After Operation DESERT STORM, it comes as no surprise that depleted uranium, or "DU," forms a vital new part of our modern arsenal. Currently increasing both the protection of armor and the effectiveness of sabot penetrators, DU rounds are also used in the A-10's 30-mm gun and under development for the Bradley's 25-mm cannon. However, users of depleted uranium need to understand the possible hazards of our latest technological wonder to help improve their effectiveness on the battlefield.



Basics

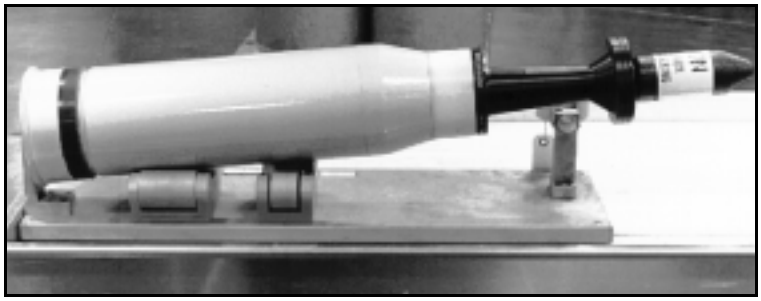
Radioactivity is the spontaneous emission (or "spitting") of alpha and beta particles or gamma rays from an atom as it decays into a different element. These emissions are called ionizing radiation. Depleted uranium is uranium ore that has been processed to remove the material useful for nuclear reactor fuel and nuclear weapons. Since the type of uranium ore that is left, U-238, makes up about 99 percent of uranium ore, plenty of depleted uranium is available to anyone with either nuclear reactors or weapons programs. This residue is a dense, heavy metal with a limited health hazard, that is still easily made into various products.

DU has two properties that make it ideal for military applications: it's extremely dense, and its surface ignites on impact (especially with steel). Unfortunately, most soldiers stop reading about DU when they get to the word "uranium" and immediately assume that it's radioactive and will kill them unless they take elaborate precautions. WRONG! DU mainly emits "alpha" radiation. Although alpha may cause the most damage to cells and tissue (compared to beta and gamma), they can't penetrate heavy clothing or skin. The beta and gamma radiation emitted by DU, even inside a tank fully uploaded with DU sabot rounds, is usually less than normal background radiation at many locations around the world.

Hazards

The two main concerns about depleted uranium are heavy metal toxicity and slight radioactivity. Like lead and other heavy metals, DU is a poison inside the body (primarily to the kidneys). DU does not present an immediate external hazard, but is an internal hazard if a soldier has open cuts or sores on the skin where the DU could enter the body. The internal hazard from radiation depends on how much DU is inhaled, swallowed, or gets under the skin. The alpha particles emitted by DU are most hazardous inside the body where the short range but high ionization of the particles damage internal tissues.

As a heavy metal (like lead), DU may make soldiers sick if eaten, inhaled, or it gets under the skin (through open cuts or wounds).



The greatest hazard from DU is the dust formed from impacts or burning. DU, basically, rusts when exposed to air, turning a dull black color. Impacts or fires can cause DU shrapnel or DU dust. This heavy black dust should be easy to identify if people take care to be aware of their surroundings. The main hazard of DU is inhaling the dust or accidentally picking it up and swallowing it if gloves aren't worn and the dust is not washed off before eating, drinking, or using the latrine.

Since DU dust is much heavier than normal dust, it is usually deposited within 50 meters downwind of the fire that generated it. The major long-term hazard from DU dust or other contamination is contamination of the ground and water supply. Take care to ensure mess, shower, and bivouac sites are not in an area of either known DU contamination or where DU dust may have been carried by recent rains, etc.

Identification

DU penetrator impacts are easily identified. In addition to the usual small, well-defined impact hole, the DU penetrator deforms very little passing through the target and has an exit hole only slightly larger than the entry hole. Both holes will register as slightly radioactive on radiac detectors. DU contamination includes penetrator parts, spalling, and dull black heavy dust found close to the impact or fire. DU contamination can be detected by AN/VDR-2 and AN/PDR-27 radiac meters, and the only way to confirm DU contamination is to identify the slight radioactivity where you wouldn't normally expect to find any.

Avoidance & Protection

The basic principles of radioactive hazard avoidance are to minimize the exposure time to the radioactivity, maximize the distance between soldiers and the radioactive source, and use shielding (in this case, even cardboard, tape, and layers of paint are effective). The objective is to avoid contaminating soldiers and equipment and minimize the spread of contamination (specifically the DU dust). Mechanic's coveralls, BDUs, leather gloves, and BDOs won't allow the alpha particles from DU to penetrate to the skin. Protective masks should be worn for respiratory protection, or, if only working around the equipment for a few minutes a cravat (bandanna) over the mouth and nose or a dust mask will protect for short exposures. If anyone is injured while working around DU equipment or wreckage, rinse out any cuts with water as soon as possible in addition to normal medical care and use a radiac meter to confirm any suspected DU contamination for appropriate additional medical treatment.

If you find radioactive DU contamination on a vehicle, move the vehicle to a site away from water sources, food storage or eating areas, and occupied bivouac sites. Brush, scrape, or wash off the loose radioactive dust from yourself or equipment, staying aware of where it goes. Clean up or mark the area as needed. Fixed (non-moveable) or embedded DU contamination should be covered with duct tape or cardboard (alpha and beta radiation are the primary emissions from DU, so covering it over with adequate shielding will reduce exposure). If the measured level of radiation in the vehicle is less than .005 cGy/hr (centigray/hour) and the vehicle is operational or can be repaired at unit level, it can be used to complete the mission (based on a maximum unrestricted individual exposure of .10 cGy). Either remove the contamination or tape over it if you can't and, unless the vehicle needs to be repaired, it's able to continue the mission until you conduct radiological decon. Of course, always keep personnel away from contaminated equipment or terrain unless required to complete the mission. Report all DU contamination up command channels immediately after confirmation of the hazard.

Awareness of DU hazards and simple, common sense procedures will deal effectively with the problem and protect soldiers. Bottom line: unless personnel are directly involved in a detonation or fire with DU, hazards are relatively small and simple procedures provide effective protection. Address any additional questions regarding depleted uranium to:

Commander, U.S. Army Chemical School, ATTN: Director, Edwin R. Bradley Radiological Laboratories, Ft. McClellan, AL 36205-5000

DSN: 865-4489 or Commercial: (205) 848-4489

References:

CPT Doug Rokke, Ph.D., 1LT John Shank, & SFC Susan Wright. "Introduction To Depleted Uranium."

USACMLS. Tier 1 Awareness, Depleted Uranium and Low-Level Radiological Hazard Training Packet. 13 Oct 94 Draft.

Conversations with CPT Doug Rokke and SFC Dante Laciste, USACMLS Edwin R. Bradley Radiological Laboratories.

FM 3-3 Contamination Avoidance.

FM 3-4 NBC Protection.

FM 3-5 Decontamination.

Captain Pat Paulsen is a Distinguished Military Graduate of North Georgia College. He is currently the NBC Detachment Commander in the 5th Special Forces Group (Airborne) at Ft. Campbell, Ky., after a tour at Ft. Carson, Colo., and completing the Chemical Officer's Advance Course. He has been the Chemical Officer for a divisional cavalry squadron, mechanized infantry and field artillery battalions, and platoon leader for cavalry scout, mechanized smoke, and support platoons.